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10/607,905	06/27/2003	Salvatore Pavone	TI-35748	7543

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EXAMINER	
BLAN, NICOLE R	
ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
12/03/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com

Office Action Summary	Application No.	Applicant(s)	
	10/607,905	PAVONE, SALVATORE	
	Examiner	Art Unit	
	NICOLE BLAN	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 16-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 16-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The addition of claims 21-24 filed on August 19, 2008 have been acknowledged. Claims 9-15 have been cancelled. Claims 1-8 and 16-24 are currently pending.

Response to Arguments

2. Applicant's arguments filed August 19, 2008 have been fully considered but they are not persuasive.

3. In response to applicant's argument regarding Law not teaching three cleaning steps, the Examiner respectfully disagrees. As clearly cited in the previous office action on page 4, the Examiner draws the applicant's attention to column 2, lines 17-21 where Law teaches that one *or* several cycles of the local cleaning sequences may be used *before* the local clean *and* extended cleaning sequence is used. In other words, if one local cleaning cycle is done before the local/extended sequence, the cleaning process is as follows: local clean followed by another local clean followed by the extended clean process. Therefore, you have a 1st, 2nd, and 3rd cleaning step. Refer also to column 12, lines 39-44 of Law for additional teaching.

4. In response to applicant's argument regarding Seamons preferred embodiment of a single step cleaning process, the Examiner does not find this persuasive. Seamons teaches *both* a single step and a multi-step cleaning process in which Seamons cites the single step cleaning process as the preferred embodiment. Even though the single step is preferred, this does not change the fact that multi-step cleaning processes are known and used. Furthermore, disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or non-

preferred embodiments. *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). See MPEP 2123. Therefore, the Examiners used of Seamons' multi-step cleaning process is proper.

5. In response to applicant's argument regarding the combination of Law and McDermott, the Examiner respectfully disagrees. As stated in the Office Action mailed on May 30, 2008 Law teaches a multi-step chamber cleaning process that changes electrode spacing in order to selectively clean electrodes and nearby chamber components. Seamons is modified to provide such limitations. Applicant's arguments do not rebut the Examiners obviousness statements because the claims were not rejected over Law in view of McDermott, rather the previous rejection was made over the combination of Seamons in view of Law and further in view of McDermott. The Examiner provides evidence as to why it would have been obvious to one of ordinary skill in the art to incorporate the teaching of Law, namely, the steps of adjusting the electrode spacing to into the teaching of Seamons. The Examiner then provided additional reasoning as to why an ordinary artisan would clean multiple substrates as taught by McDermott in the modified teaching of Seamons. Applicant's cited the teaching in Law is directed to the deposition system; however, this does not negate the teaching relied upon by the Examiner regarding the teaching of adjusting electrode spacing to effectively clean the electrodes and nearby chamber parts. Applicants have not argued the proper combination. Furthermore, no such assumption was made by the Examiner to incorporate the deposition system of Law into the other prior art references.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1, 2, 4, 5, 7, 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seamons et al (U.S. 6,060,397), in view of Law et al (U.S. 4,960,488), and further in view of McDermott et al. (U.S. PGPub 2004/0055621).

Seamons teaches an in-situ cleaning of residues for a CVD chamber comprising introducing a fluorocarbon gas under the certain cleaning conditions inside the chamber and detecting endpoint of cleaning. As a fluorocarbon gas, C_3F_8 is specifically recited (col.4, lines 30-34; col. 10, lines 26-36, 48-62). Seamons also indicates that the cleaning method may be performed using a multi-step cleaning process wherein electrode spacing is adjusted to selectively clean inner and outer surfaces of the interior wall of the chamber and other surfaces. While indicating a multi-step cleaning process, Seamons remains silent about maintaining the pressure during the cleaning in the way specified in the instant claims 1 and 16.

Law teaches an effective multi-step CVD chamber self cleaning process, which includes adjusting the electrode spacing in order to selectively clean electrodes and nearby chamber components under high pressure (localized cleaning) and clean the more distant areas of the chamber at lower pressure, wherein cleaning electrodes and nearby chamber components under the high pressure is repeated a number of times (reads on "a first cleaning step" and "a second cleaning step"' as instantly claimed) before the lower pressure cleaning (reads on "a third cleaning step", as instantly claimed) is performed (col. 2, lines 17-21; paragraph, bridging col. 11 and 12; col.15, lines 3-5).

Therefore, since Seamons is concerned with multi-step cleaning of CVD chamber and Law provides the sequence of processing steps to effectively clean the CVD chamber, one skilled in the art motivated by Law would have found obvious to utilize the sequential processing steps of Law in order to effectively clean residues from interior surfaces of CVD chamber in the multi-step cleaning process of Seamons with the reasonable expectation of success.
Law and Seamons remain silent about a chamber having multiple substrate stations. However, McDermott teaches that treatment of multiple substrates is known in the art (page 1, paragraph 160), one skilled in the art would have found obvious to utilize a deposition chamber with multiple substrate treatment stations in lieu of the CVD chamber of Seamons, if processing a number of similar substrates under similar processing conditions are required, and perform cleaning of such chamber as per teaching of Seamons/Law in order to enhance production output and provide cost efficient processing.

With regard to claim 16, while teaching the steps of placing (transferring) a wafer (substrate) into CVD chamber, depositing material layers on the wafer (paragraph, bridging col.

3 and 4) and cleaning the CVD chamber in multiple steps, Seamons remains silent about transferring a plurality of substrates into a deposition chamber having multiple substrate stations. However, McDermott teaches that treatment of multiple substrates is known in the art (page 1, paragraph 160), one skilled in the art would have found obvious to utilize a deposition chamber with multiple substrate treatment stations in lieu of the CVD chamber of Seamons, if processing a number of similar substrates under similar processing conditions are required, and perform cleaning of such chamber as per teaching of Seamons/Law in order to enhance production output and provide cost efficient processing.

With regard to claim 4, since the first and second cleaning steps of Seamons/Law are used for localized cleaning, and cleaning time depends on frequency of cleaning steps and particular deposits to be removed, thus representing result effective parameter, it is within the skills of the ordinary skilled in the art to establish a proper time for such cleaning to obtain the optimum performance of CVD processing equipment. With regard to the limitation reciting that a duration of the third cleaning step is a function of the duration of the first cleaning step, one skilled in the art would have found obvious to establish such function since the third cleaning step is used as the final cleaning step, the effectiveness of which obviously depends on the cleanness of the localized areas of CVD chamber, performed by the first cleaning step.

With regard to claim 5, since Law teaches cleaning of extended chamber area under higher pressure, one skilled in the art would have found obvious to raise the pressure in the second cleaning step to extend the cleaning area upon first cleaning step in order to reduce total chamber cleaning time, thus enhancing output of the CVD processing equipment.

With regard to claim 17, Seamons suggests to connect a selected particle count threshold limit with selected deposition rate (paragraph bridging col.5 and 6).

With regard to claim 18, Seamons teaches a wipe clean out of the CVD chamber. As to the limitations of claims 19 and 20, it is within the skills of the ordinary skilled in the art to determine the thickness of the deposits and the number of deposition hours upon which the cleaning must be effectuated.

9. **Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seamons et al (U.S. 6,060,397) in view of Law et al (U.S. 4,960,488) in view of McDermott et al. (U.S. PGPub 2004/0055621) and in further view of Richardson et al (U.S. 7,028,696).**

With regard to claim 3, Seamons teaches CVD chamber cleaning wherein endpoint is determined by monitoring optical emissions from fluorine (col. 5, lines 33-39; col. 6, lines 35-67; col. 7, lines 1-5). Seamons remains silent about monitoring optical emission from carbon monoxide. However, monitoring optical emission from carbon monoxide is utilized in the art wherein oxygen is also used for chamber cleaning. Thus, Richardson teaches monitoring optical emission to detect endpoint of chamber cleaning. In addition to monitoring optical emission from fluorine, Richardson specifically indicates monitoring optical emission from carbon monoxide upon using oxygen for chamber cleaning, which leads to the formation of carbon monoxide (col. 11, lines 19-49).

Therefore, since Seamons/Law teach the use of gaseous cleaning mixture containing oxygen and Richardson teaches the chamber cleaning process utilizing oxygen and monitoring optical emission from carbon monoxide for determining the endpoint of chamber cleaning, one

skilled in the art motivated by Richardson would have found obvious to monitor optical emission from carbon monoxide in addition to fluorine in order to precisely determine the endpoint in CVD chamber cleaning process of Seamons/Law.

The teaching of Seamons/Law remains silent about controller, as specified in claim 8. However, computerized process controllers are conventionally utilized in the art. Thus, Richardson teaches two step chamber cleaning operation controlled by computer to automatically start the wafer-less plasma cleans at set wafer processing intervals. The process parameters are input as a recipe and the process parameters are controlled by a system, such as a programmable logic controller that interfaces with the reaction chamber. Therefore, one skilled in the art motivated by Richardson would have found obvious to utilize a controller to automate and enhance efficiency of the multi-step chamber cleaning processing of Seamons/Law.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seamons et al (U.S. 6,060,397) in view of Law et al (U.S. 4,960,488) in view of McDermott et al. (U.S. PGPub 2004/0055621) and in further view of Cheung et al (U.S. 5,158,644).

Seamons/Law do not specifically indicate flow rates of fluorocarbon as instantly claimed. However, since the flow rates of cleaning gases are result effective, discovery of optimum value of result effective variable in known process is ordinarily within the skill in the art and would have been obvious. Besides, such rates are conventionally used in the art while cleaning CVD chamber with fluorocarbons. Thus, Cheung teaches two-steps cleaning of CVD chamber, wherein the same fluorocarbon is used in both steps and wherein the flow rates of fluorocarbon correspond to the instantly claimed values (col.6, lines 36-45). Therefore, one skilled in the art

would have found obvious to utilize the fluorocarbon flow rates of Cheung while cleaning the CVD chamber in the process of Seamons/Law with the reasonable expectation of success.

11. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seamons et al (U.S. 6,060,397) in view of Law et al (U.S. 4,960,488) in view of McDermott et al. (U.S. PGPub 2004/0055621) and in further view of Kil et al. (Korean Patent 1020010055436).

Claims 21-23: Seamons, Law, and McDermott teach the limitations of claim 1 above. McDermott teaches that it is known to clean multiple substrates in a single chamber, but they do not teach a showerhead or plurality of showerheads over each substrate station. However, Kil teaches that it is known to have a showerhead positioned over each substrate station [see abstract and Figure on last page of the reference]. Therefore, it would have been obvious to an ordinary artisan to use individual showerheads for each station as taught by Kil in modified method of Seamons because Kil teaches that it improves yield and productivity.

Seamons, Law, McDermott and Kil do not teach a plurality of showerheads locate above one of the stations. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use multiple showerheads above the station, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

12. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seamons et al (U.S. 6,060,397) in view of Law et al (U.S. 4,960,488) in view of McDermott et al. (U.S. PGPub 2004/0055621) and in further view Jeon (U.S. Patent 6,305,390).

Claim 24: Seamons, Law, and McDermott teach the limitations of claim 1 above. Law teaches a three step cleaning process in which the first and second steps utilize the same pressure and the third step is at a pressure lower than the first and second steps. They do not teach that the second pressure is different than the first pressure. However, Jeon teaches a three step plasma chamber cleaning process in which the first steps pressure is the highest pressure, the second steps pressure is lower than the first pressure, and the third steps pressure is lower than the second [col. 3, lines 62-67 and col. 4, lines 1-17] so that all of the chamber parts with in the chamber are completely cleaned [abstract]. Therefore, it would have been obvious to an ordinary artisan to use a different pressure between the first and step and use a lower pressure for the third step as taught by Jeon in the modified method of cleaning of Seamons with a reasonable expectation of success because Jeon teaches that all of the parts within the chamber are completely cleaned when the pressures are varied.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE BLAN whose telephone number is (571)270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. B./
Examiner, Art Unit 1792

/Alexander Markoff/
Primary Examiner, Art Unit 1792